

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS

ALFALFA GROWING
IN
ALBERTA

BY

W. H. FAIRFIELD, M. S.

Superintendent Experimental Station, Lethbridge, Alta.

AND

G. H. HUTTON, B. S. A.

Superintendent Experimental Station, Lacombe, Alta.

BULLETIN No. 8

Second Series

Bulletins of the Second Series of the Bulletins of the Experimental Farms treat of such subjects as are of interest to a limited class of readers and are mailed only to those to whom the information is likely to be useful.

Published by direction of the Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa

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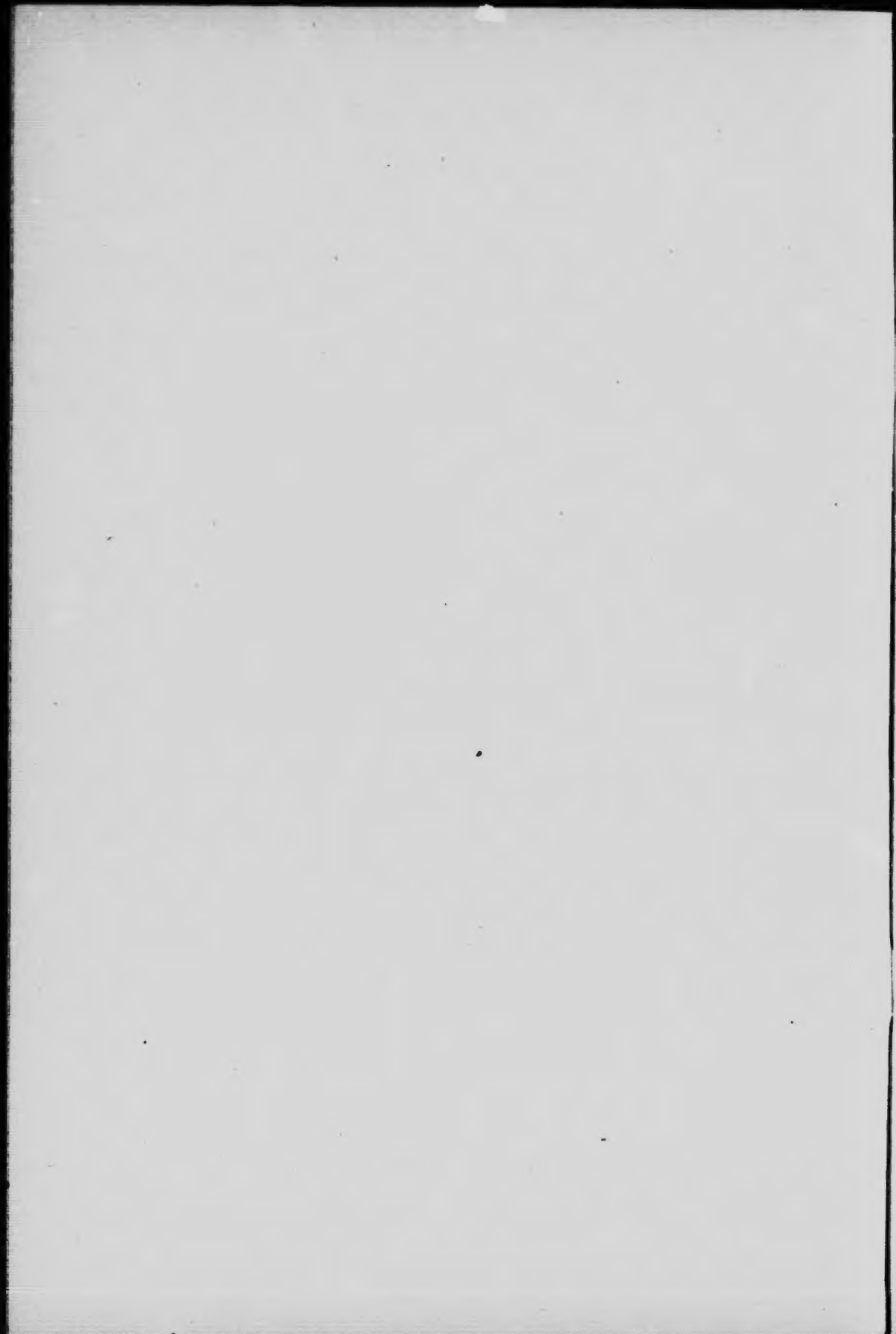
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To the Honourable,
The Minister of Agriculture,
Ottawa,

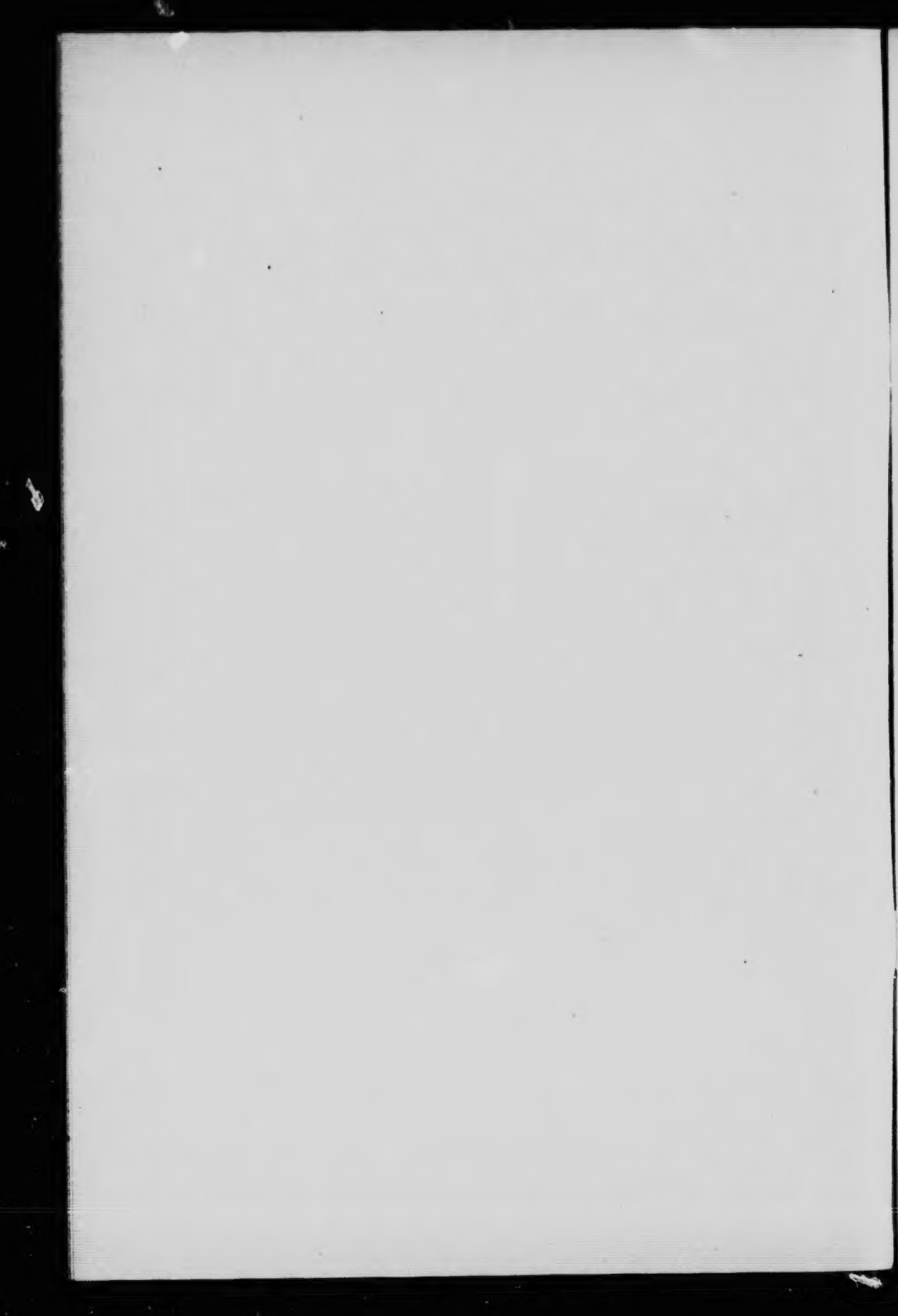
Sir,—I have the honour to submit for your approval Bulletin No. 8 of the Second Series entitled "Alfalfa Growing in Alberta" prepared jointly by Messrs. W. H. Fairfield, Superintendent Experimental Station, Lethbridge, Alta., and G. H. Hutton, Superintendent Experimental Station, Lacombe, Alta.

The ever increasing demand for information as to the possibilities of growing, the best methods of starting alfalfa fields and of handling the crop in Alberta indicates the need for such a publication as this to supplement the information contained in our bulletin No. 46 entitled "Alfalfa or Lucerne" which deals with this crop in a more general way and discusses Eastern rather than Western conditions.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms.

Ottawa,
February 20th, 1912.



INDEX.

	PAGE
ALFALFA	
Character of Growth of	7
Discing of	12
Fields, Life of,	12
Hay, Curing of,	11
Irrigation of,	7, 12
Location, suitable for,	8
Seed, Mixtures of,	12
Quantity to sow,	10
Raising of	11
Strains of,	10
Testing of	10
Treatment of the first Season	11
NURSE CROPS	10
SOWING, DATES OF	10
SOIL, inoculated, Supply of	9
Inoculation of,	8
Preparation of,	8
Suitable for Alfalfa	8
SUMMARY	13

ALFALFA GROWING IN ALBERTA.

While the production of Alfalfa has been increasing rapidly during the past few years in Alberta, there is an ever-increasing demand for information in regard to the cultivation of this crop. The suggestions offered herein as to the cultural methods likely to succeed are based upon tests conducted at the Experimental Stations at Lethbridge and Lacombe as well as upon observations of the methods of successful growers of alfalfa in various parts of the province. The soils and climate of the settled portions of Alberta are represented by the Stations at which the work has been done as closely as any two points can represent those somewhat varying conditions and the results secured should be of value as an indication of what may be expected in other parts.

As an indication of the interest shown in the cultivation of alfalfa, it may be said that in the last two years over eleven hundred farmers have applied for and received inoculated soil for the purpose of beginning the culture of this forage crop. Many of those who secured soil for this purpose during the first year or two it was distributed are now reporting on the results obtained and not more than one per cent. have stated that, in their opinion, alfalfa cannot be grown in their district. In the central portion of the province, where it is important that hardy strains or varieties be secured, some men report indifferent success but attribute their partial failure to the fact that the seed secured was an inferior variety.

Alfalfa is being grown commercially in the Lethbridge district to the extent of several thousand acres under irrigation and successfully grown in practically all other districts without irrigation. By the aid of irrigation, the yield is very materially increased. It is, in fact, a crop especially profitable to grow on irrigated land. In the drier districts of the province, on unirrigated land, although the tonnage is very much less, alfalfa will probably produce more hay than will any other perennial forage crop that can be grown there. It is now grown as far north as Fort Vermilion, so demonstrating the wonderful diversity of climate to which it can adapt itself.

There is no fodder crop the equal of alfalfa for feeding growing stock or dairy cattle. It is very rich in protein and, since it draws its supply of nitrogen largely from the air, supplies at low cost as well as in readily digestible form those constituents necessary to the formation of lean meat and milk.

The subject of alfalfa growing has also been treated of in bulletin No. 46 Experimental Farms series, copies of which are obtainable on application.

Alfalfa is a plant that seems particularly fitted for cultivation under irrigation. Not that it requires an excessive amount of moisture to thrive, but rather because it can withstand long seasons of drought, and when moisture is supplied, resumes rapid growth with apparently no set-back due to the forced stand-still. On the average irrigated farm, it is not usually practicable for the farmer to irrigate every part of his farm just when it should be. There are sure to be certain fields, or parts of fields, that cannot be reached just when the crop requires moisture. With most crops, this may cause a serious loss, but with alfalfa it means a loss of growth only while the soil is in a very dry condition. It is during July and August, our hottest months, that this plant makes its most rapid growth, provided the moisture in the soil is not exhausted, which can be prevented when irrigation is practised.

Without irrigation, the second and third cuttings are somewhat uncertain from the fact that the growth of the plant, up to the first cutting, uses up the moisture to a large extent and, unless good midsummer rains come, the soil is often too dry to produce a very heavy crop afterwards. Notwithstanding this fact, it is safe to say that, with suitable varieties and with proper care in starting, not only can alfalfa be grown on non-irrigated lands but more hay can be obtained from it than from any other forage crop. Every farmer in the province should obtain enough inoculated soil to treat from half an acre to an acre of land, and from this start, establish at least five acres of alfalfa.

LOCATION AND SOIL.

Select land that is well drained, i. e., in which there are no pockets or depressions to collect and hold water during wet periods, not necessarily land that is high and exposed, but it must not be wet or soggy and the ground water should never be nearer to the surface than from three to five feet at any time during the year. This is quite important, as alfalfa is not a plant that will tolerate "wet feet". It prefers a sandy soil with an open subsoil, though this is by no means essential to its success. River bottom land often offers ideal conditions for its growth.

PREPARATION OF THE SOIL.

The land should have been under cultivation a sufficient length of time to kill out the native grasses, for it has been found that, if these native grasses come up to any extent during the first or even the second season in a field sown with alfalfa, they retard the growth of the alfalfa plants, which are easily injured in this way until they become well established. The ideal condition of soil would be to take the ground on which potatoes or other hoed crops have been grown, or summer-fallowed land, and prepare the seed bed by discing or harrowing, or both. If the land is in suitable condition, it is better not to plough in the spring. If such conditions are not obtainable, stubble land may be used by ploughing and preparing a good seed bed, after the land has been suitably firmed by packing.

INOCULATION.

As alfalfa furnishes a very nutritious hay, being particularly rich in nitrogenous or flesh-forming constituents, and as it yields heavily, it might be expected to impoverish the available nitrogen in the soil and thus diminish its fertility very rapidly. Nature, however, arranges for any heavy draught on the nitrogen of the soil that might accompany the growing of alfalfa or other legumes by the fact that the plants receive nitrogen from the air through the agency of certain bacteria that live on their roots. These bacteria have the power of absorbing the free nitrogen in the air present in the soil and passing it on to their host plant, the alfalfa or other legume, in such a form that it enters the general circulation of the plant to build up its various tissues of leaf, stem and root. These bacteria may develop rapidly and thus store up very large amounts of nitrogen in the legume crop. The decay of the roots and of the whole plant when ploughed under, enriches the soil in nitrogen, and thus it is that the growth of alfalfa, or other legume, invariably increases the soil's fertility.

Sometimes these bacteria which live on the roots of the alfalfa are not present in the field when the seed is sown, with the result that the crop grows well the first season, as difficulty in obtaining a stand is seldom met with, but, in the summer following, the plants indicate lack of vigour, quite often assuming a light or yellowish-green colour. This condition is ascribed to the fact that the plants, being such greedy feeders, have used up a great portion of the available nitrogen the first season, and consequently lack a sufficient supply for the second year's growth. During the second season, spots from one to two feet in diameter may often be observed where the foliage is a dark, rich green, and the plants are taller than the majority of those in the field. Where these dark healthy spots are, no doubt, bacteria are present, having been introduced by the germs being on individual seeds or on foreign matter in the seed, or possibly they were present in the native soil, having previously lived on some of the native legumes.

The presence of bacteria on the roots of alfalfa is indicated by small, whitish nodules, about the size of a pinhead or smaller. These often form in clumps, resembling somewhat a miniature bunch of grapes, and are more often found on the newer roots. When looking for these bunches, great care should be taken or they will be entirely stripped from the roots as the plant is lifted.

In Alberta, it has been found that it pays to inoculate the soil with these bacteria when the seed is sown, for fields thus inoculated do not assume the unthrifty appearance the second season that fields not so treated show. The usual practice here in inoculating has been to use soil from an old alfalfa field. This is sown on the land at the rate of from 100 to 200 pounds per acre and worked in as the seed bed is prepared. The soil taken from an area where sweet clover (*Melilotus alba*) is growing may also be used successfully for inoculating.

**INOCULATED ALFALFA SOIL SUPPLIED BY THE EXPERIMENTAL
STATIONS FOR A NOMINAL CHARGE.**

In new districts, where alfalfa has not been grown, it is often difficult for farmers to obtain inoculated soil from an old alfalfa field, so the Stations at Lacombe and Lethbridge will supply a sack of the soil to farmers on the payment of \$1.00. Besides covering the expense of sacking, this will prepay the freight to the applicant's nearest railway station.

Applicants will be limited to one sack each, which will contain not less than 100 pounds of soil. Farmers in the province from Calgary south should apply to the Lethbridge Experimental Station, those living north of Calgary should apply to the Lacombe Experimental Station. To be more exact, those living in township 25 or south will be supplied from Lethbridge, those living north of township 25 from Lacombe.

If the land to be seeded to alfalfa is in good condition and moist, 100 pounds is sufficient for an acre, if not, then the inoculated soil should be distributed over a less area. Although 100 pounds of inoculated soil is, under all ordinary conditions, quite sufficient for an acre, still, where the soil can be obtained without much inconvenience, such as from an neighbouring farm, it will be found that 150 to 200 pounds or even more can be scattered much more easily over an acre.

Immediately after the inoculated soil is applied, the land should receive a cultivation such as discing or harrowing or both so as to incorporate it into the soil of the field as soon as possible, since the direct rays of the sun destroy bacterial life.

SEED.

All large houses carry alfalfa seed in stock and care should be taken in buying that the best is selected. Weed seeds are frequently introduced in alfalfa seed and any persons buying seed should exercise great care in this regard. Samples of the seed offered for sale may be submitted to the Seed Laboratory, Calgary, for analysis and test as to freedom from weed seeds and for vitality. This work is done without charge. In the Lethbridge district, practically no winter-killing has been experienced and less attention need be paid to the selection of varieties in that vicinity but in other sections of the province, the question of varieties is important and the Grimm and Turkestan have been found to resist trying conditions much better than other sorts. At the Lacombe Station, more than 90 per cent of the plants of the above varieties have survived the winter, while other kinds, except the yellow-flowered Siberian alfalfa (*Medicago falcata*) have fallen below 70 per cent. to as low as 20 per cent. Next to Grimm and Turkestan, Montana-grown seed might be placed with reference to its probable hardness.

QUANTITY OF SEED.

Sufficient experiments have not yet been carried on in the province to warrant a very definite opinion being formed as to the best amount of seed to use. From our present knowledge, we would suggest on irrigated land 15 to 20 pounds of seed per acre; where the land is not to be irrigated, somewhat less is advised, the quantity being placed at from 12 to 15 pounds per acre, except in those parts of the province where the rainfall is lightest, where 10 to 12 pounds is suggested.

DATE OF SEEDING.

From the 10th to the 25th of May is perhaps the best time to sow alfalfa here, although early in June is usually quite satisfactory.

DO NOT SOW WITH A NURSE CROP.

It is well to remember that alfalfa originally was a sub-tropical plant, and, although it has wonderful adaptability, it is somewhat tender while young, under our conditions. It welcomes sunshine and warmth, consequently it does not do as well when shaded by a growing crop of grain. It has been aptly said that the nurse crop might more properly be termed a murder crop.

TREATMENT THE FIRST SEASON.

It is quite important that the young plant should be clipped once or twice the first season. This serves not only as a check to the weeds, but tends to make the plant more stocky. When not cut, the alfalfa plants, if they are fortunate enough not to be choked completely out by the weeds, often form blossoms and put their energy into forming or starting to form a seed pod, while this energy should be devoted to root development, which is the result when the plants are cut occasionally. A good time to make the first cutting is when the plants and weeds are from six to ten inches high, which usually occurs late in June or in July. The last cutting in the first season should not be later than the tenth of August. It is immaterial whether these light cuttings be raked off or not, for, if not too heavy, they serve a purpose in acting as a mulch. If irrigation is to be practised, the field should be wet when the plants indicate that they require moisture, but not before. One irrigation the first season is usually sufficient, although an additional flooding late in the autumn has sometimes been found beneficial.

CURING THE HAY.

To get the best quality of hay, particular care must be given alfalfa in curing and handling it. The first point of importance to remember is, that it must be cut young, for at this stage in its development it is more nutritious as well as

more palatable. As soon as blossoms appear, alfalfa is ready to cut, or, as expressed by some, when one-tenth of the field is in bloom. The hay should be raked as soon as possible after cutting and immediately put into small cocks. Curing it in the cock in this way prevents the leaves from breaking off, which is quite important when it is considered that much of the nourishment is in the leaf.

On irrigated land in the Lethbridge district, it has been customary to cut the alfalfa three times, the first cutting usually occurring about June 20th to 25th; the second the first week in August, and the third cutting about the time of frost. On non-irrigated lands, it has been found that two cuttings are all that can usually be obtained. These average from $2\frac{1}{2}$ to $3\frac{1}{2}$ tons per acre for the season. Experience has led the writers to believe that very late cutting is not wise, notwithstanding the fact that, up to the present time, it has usually been practised.

RAISING SEED.

The seed crop varies greatly and seems to be quite uncertain in all countries, though some localities seem to be favoured in this respect much more than others. A limited quantity of seed has been grown in Southern Alberta, but so far, the yield appears to be small. Time is the only thing that will determine whether Alberta or any districts in Alberta are well suited to the growing of alfalfa seed. It is quite probable that irrigation is not advisable for this phase of alfalfa culture. The stand should be very thin to allow the blossoms to form and mature well down on the stems, otherwise the yield of seed will be small.

The most satisfactory way of planting alfalfa, if the object in view is to raise seed, is to plant in rows and cultivate between. The best distance to place the rows apart, under cultivation, has not yet been determined. It varies all the way from 21 inches to 42 inches; probably 28 to 36 inches is not far from the very best distance.

MIXTURES.

Under irrigation, in the Lethbridge district, mixtures of alfalfa and grasses, such as Timothy, Brome grass, and Western Rye grass have been eminently successful, the grass growing much more vigorously than when grown alone, and the alfalfa growing apparently almost as well as when sown by itself. The grasses being shallow-rooted and the alfalfa deep-rooted, it is but natural that they would not interfere with each other, and the grasses thrive on the fertility added to the soil through the growth of the alfalfa. But two crops are obtained in a season from these mixtures, owing to the fact that the grasses are not ready to be cut until sometime in July. The crops are, however, sufficiently heavier to compensate in great measure for the loss of the third cutting. After the first cutting, the grasses do not make much growth, consequently the second cutting is clear alfalfa. The only objection so far found to these mixtures is that the grasses are apt to crowd the alfalfa out, the stand of alfalfa becoming thinner.

It would seem advisable in starting these mixtures, to sow but a small quantity of grass seed, say from two to four pounds per acre, and reduce but little the amount of alfalfa seed. So far, the alfalfa has been mixed with but one grass, as alfalfa and timothy, or alfalfa and brome grass, etc. The most satisfactory method has been to sow the alfalfa alone, and, in the spring of the second year, harrow in the grass seed, for it has been found that occasionally the grass seed is so much more vigorous the first and second seasons than is the alfalfa, that it seriously thins the stand of the latter at the very beginning.

LATE FALL IRRIGATION.

Late fall irrigation appears to be very advantageous. It saturates the ground for the winter and rapid growth is made as soon as growing weather comes in the spring. Hence no irrigation is required to make a maximum yield of the first cutting, while irrigating the alfalfa early in the spring sometimes checks the growth for a time, due to the ground being made cold from excess of moisture.

DISCING.

In recent years, in alfalfa-growing districts, the practice of discing the alfalfa fields is becoming quite common. The discs are set at a slight angle and, if necessary, the implement is weighted. The object is to break any surface crust on the soil, form a mulch and generally invigorate the crop. This should be done early in the spring, just after the frost has disappeared. It may also be done after each cutting is made.

On dry land, the discing has a particular advantage, for this cultivation is of great aid in conserving moisture.

LIFE OF AN ALFALFA FIELD.

In districts where the plant thrives, it is hard to say how long a life it may have. The writers have seen fields in Colorado that have been producing hay for twenty-five years and they seemed just as thrifty and produced apparently just as luxuriant a growth as did neighbouring fields that were many years younger. In California, fields are reported to be yielding well that are over fifty years old.

Under our conditions here, it seems quite evident that it would be better to allow the fields to remain seeded down for a number of years, say not less than five or six at the least, for the reason that it takes two years or more for them to become well established. It has been observed that fields four or five years old yield better than those but two or three years old.

TO SUMMARIZE BRIEFLY.

Use summer-fallowed land or land in which root crops have been grown the previous season. Do not plough it in the spring, but prepare a good, shallow seed bed.

Inoculate the land with, say, 100 to 200 pounds of soil from an old alfalfa field and work in while the seed bed is being prepared.

Sow the seed in May or early in June at the rate of fifteen to twenty pounds per acre on irrigated land and ten to fifteen on non-irrigated land.

Do not use a nurse crop.

Select hardy varieties, securing seed free from weed seeds and of strong vitality.

The first season do not neglect to run the mowing machine over the land before the weeds get too high, and cut it a second time if practicable.

Those intending to sow alfalfa here for the first time should not be dismayed by the number of precautions given in the foregoing pages, for they will find that, although alfalfa is a plant that is tender when young, it is extremely hardy when once established and that it will continue to produce heavy crops of hay with little care and attention.

